ParaDocsHealth

Using a ML-Enabled EMR Provider Workflow to Improve Patient Care & Streamline Non-Clinical Tasks

SHPCP October 2023 Lunch & Learn

Why Now ?

ParaDocsHealth

LESS TIME
7 minutes for an outpatient visit

MORE PATIENTS
28 million Medicare* patients in 2023

MORE PAPERWORK
5x increase** since 2010

LESS DOCTORS
50k shortage*** by 2034
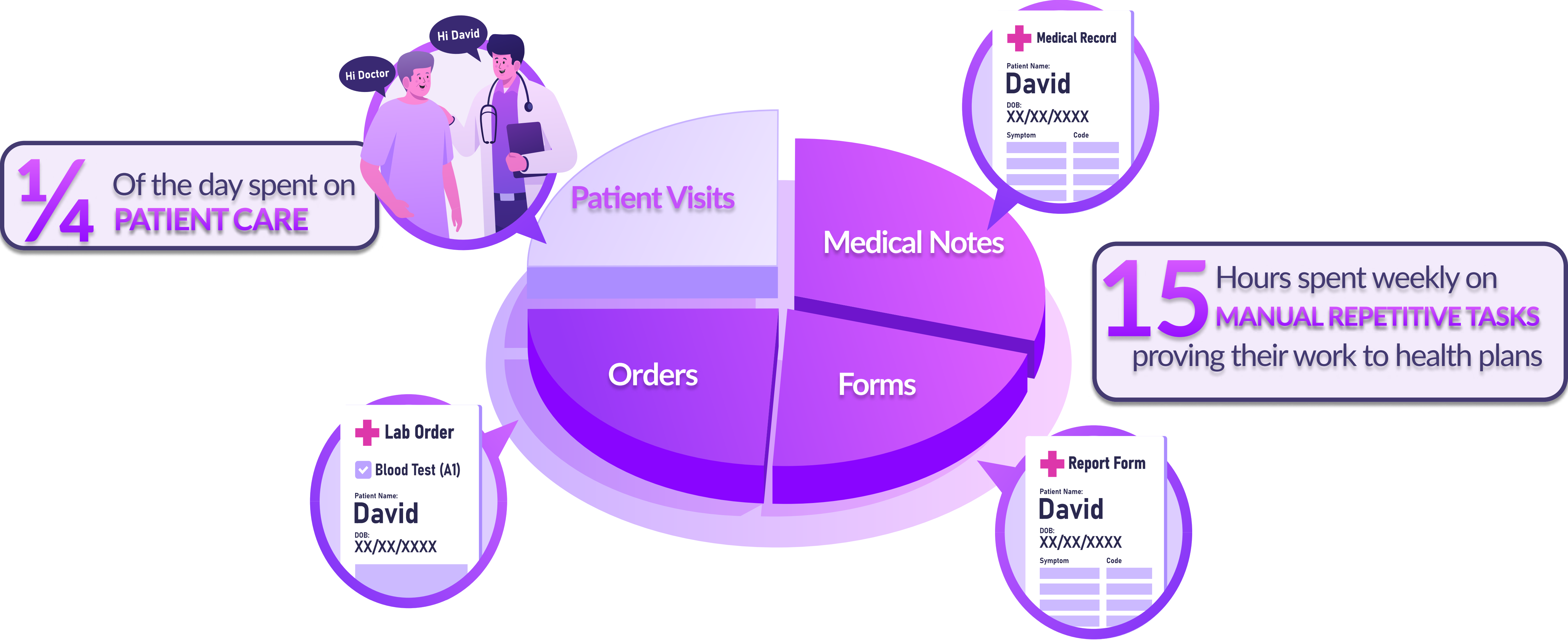
HIGHER EXPENSES
30% Spent on Reporting!!

$4.3T
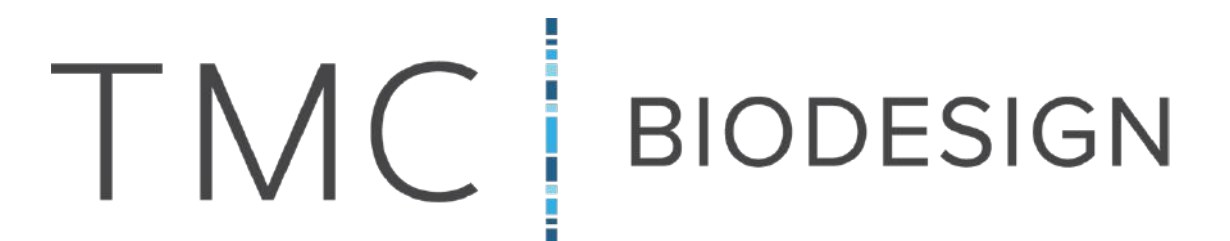
* CMS.gov (2022 MA Enrollment Report)   ** AAMC.org (2021 Press Release)   *** Bain & Company (2023 Report)

ParaDocsHealth

What If....

We can **optimize quality care and reporting** without burdening healthcare providers?

Pilot Study

Mid-sized Clinic

3,000 patients / month

Problem:

- 5x documentation volume
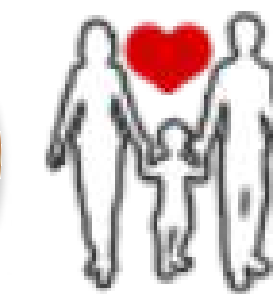- Manually Intensive Process
- Care gaps fall between cracks

Impact:

5 week study

10 minutes saved / visit

Additional Revenue Stream for Practice

- Increase reimbursement
- Decrease overhead
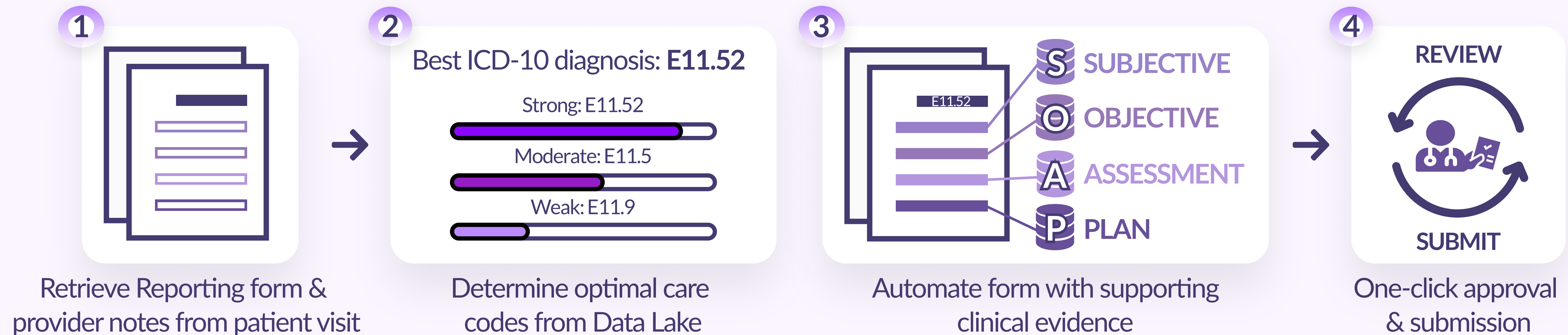- New patient visits

More patient engagement

CYPRESS PHYSICIAN ASSOCIATION

Dr. Glenn Davis, MD

" Working with ParaDocs Health allowed me to spend more time with patients and accurately fill out the necessary paperwork for reimbursement. "

Augmented-Automation Workflow

1 Retrieve Reporting form & provider notes from patient visit

2 Best ICD-10 diagnosis: **E11.52**

Strong: E11.52

Moderate: E11.5

Weak: E11.9

Determine optimal care codes from Data Lake

3 E11.52

S SUBJECTIVE
O OBJECTIVE
A ASSESSMENT
P PLAN

Automate form with supporting clinical evidence

4 REVIEW

SUBMIT

One-click approval & submission

Patient Assessment Form Study

Patient Assessment Form

Key Performance Indicators	2022	2023
Number of Forms	160	180
Personnel Time	30 Hours	5 hours
Total Submitted	48%	100%
Time Spent/Month	30 Hrs	5 Hrs
Accuracy	10%	98%
Risk-Adjusted Factor (RAF) Score Improvement		**+3%**
Impact on Revenue per Provider		**+ $19,000**

Care Gap Closure Study

Diagnostic Procedure Order

DIAGNOSTIC PROCEDURE ORDER FORM
Cardiopulmonary Stress Testing & Ultrasound

Frontera Fax: 877-631-0737
Frontera Phone: 866-945-8700
Client.teamfrontera.com

Patient Name (Last)-PLEASE PRINT   Patient Name (First)-PLEASE PRINT

Date of Birth   Test Date   Test Time   AM/PM   Ordering Physician

Frontera ID#   Gender   Height   Weight   BMI

CMET/CARDIOPULMONARY STRESS TEST
All Inclusive ICD-10 Codes cover both Cardiac & Pulmonary requirements for CMET as well as Resting Echo
If an All inclusive ICD-10 does not apply, select at least one cardiac & one pulmonary code in the sections below to cover a CMET

☐ CMET only includes all of the following CPT codes: 94621, 94375, 94727, 94729

ALL INCLUSIVE CODES

☐ R06.09-Other forms of Dyspnea   ☐ R06.02 Shortness of Breath   ☐ Other ICD-10 code(s) and narrative:_____
Please provide ALL applicable ICD-10 codes for all test(s) ordered

CARDIAC CODES   Please select:

I10 Essential Primary Hypertension*	I35.0 Nonrheumatic aortic (valve) stenosis*
I20.0 Unstable angina*	I35.1 Nonrheumatic aortic (valve) insufficiency*
I20.8 Other forms of angina pectoris*	I42.1 Obstructive hypertrophic cardiomyopathy*
I24.0 Acute coronary thrombosis not resulting in myocardial infarction*	I48.19 Other persistent atrial fibrillation*
I24.8 Other forms of acute ischemic heart disease*	I50.22 Chronic systolic (congestive) heart failure
I25.110 Atherosclerotic heart disease of native coronary artery with unstable angina pectoris*	I50.89 Other heart failure
I25.5 Ischemic cardiomyopathy*	R00.2 Palpitations
I27.0 Primary pulmonary hypertension*	R00.8 Abnormal Heart Sounds-Other
I27.89 Other specified pulmonary heart diseases	Z86.16 Personal History of COVID-19*
I34.2 Nonrheumatic mitral (valve) stenosis*	
Other ICD-10 code(s) and narrative	*May require additional coding*

PULMONARY CODES   Please refer to CMET area above

J47.0 Bronchiectasis w/ acute lower respiratory infection	R05.8 Cough-Other Specified
J47.1 Bronchiectasis w/ (acute) exacerbation	R06.01 Orthopnea
J47.9 Bronchiectasis- uncomplicated	R06.02 Shortness of breath
J84.111 Idiopathic interstitial pneumonia-NOS	R06.09 Other forms of dyspnea
J84.112 Idiopathic pulmonary fibrosis	R06.1 Stridor
J84.113 Idiopathic non-specific interstitial pneumonitis	R06.2 Wheezing
J84.114 Acute interstitial pneumonitis	R06.3 Periodic breathing
J84.115 Respiratory bronchiolitis interstitial lung disease	R06.4 Hyperventilation
R05.1 Acute Cough	R06.82 Tachypnea, NOS
R05.2 Subacute Cough	R06.89 Other abnormalities of breathing
R05.3 Chronic Cough	Z86.16 Personal History of COVID-19*
R05.4 Cough Syncope	Z87.09 Personal HX of other diseases of the respiratory system*
Other ICD-10 code(s) and narrative	*May require additional coding*

PULMONARY FUNCTION TEST CODES   Please select :   ☐ Pulmonary Function Test   ☐ Pulmonary Function Test Pre/Post Bronchodilator

J22 Acute (lower) respiratory (tract) infection NOS*	J45.40 Moderate Persistent Asthma-NOS*	R06.02 Shortness of Breath
J40 Bronchitis-NOS	J45.50 Severe Persistent Asthma-NOS*	R06.2 Wheezing
J44.0 COPD w/Acute LRI	J45.909 Unspecified Asthma-NOS*	R06.09 Other Forms of Dyspnea
J44.1 COPD w/Acute Exacerbation	J45.990 Exercise Bronchospasm*	R06.81 Apnea-NOS*
J43.9 Emphysema-unspecified	J45.991 Cough variant asthma*	R06.89 Other abnormalities of breathing
J45.20 Mild Intermittent Asthma-NOS*	J45.998 Other asthma*	Z86.18 PRSN History of COVID-19*
J45.30 Mild Persistent Asthma-NOS*	R05.8 Other specified cough*	Z87.09 PRSN HX of other diseases of the respiratory system
Other ICD-10 code(s) and narrative		*May require additional coding*

ECHOCARDIOGRAM CODES   Please select: ☐ Resting ECHO-Complete   ☐ Stress ECHO-Complete   ☐ Resting ECHO-Follow-Up/Ltd Study   Please specify:

I09.89 Other specified rheumatic heart disease	I49.2 Premature Beats-Junctional*	R55 Syncope & Collapse*
I10 Essential Primary Hypertension*	I49.3 Premature Beats-Ventricular*	R91.8 ABN Findings of Lung Field-unspecified*
I11.0 Hypertensive heart disease W/ Heart failure*	R00.2 Palpitations*	R93.1 ABN findings on diagnostic imaging of heart and coronary circulation*
I11.9 Hypertensive heart disease W/O Heart failure*	R01.0 Benign/Innocent Cardiac Murmur*	R94.31 ABN EKG*
I25.2 Old myocardial infarction*	R01.1 Cardiac Murmur-NOS	T50.905S Adverse effect of NOS Drug** cannot be billed alone
I25.89 Other forms of chronic ischemic heart disease *	R06.02 Shortness of Breath	U07.1 COVID-19
I34.1 Mitral Valve Prolapse	R06.09 Other Forms of Dyspnea	Z86.16 PRSN HX of COVID-19*
I34.2 Nonrheumatic mitral (valve) stenosis	R07.81 Pleurodynia*	Z87.74 PRSN HX of (corrected) congenital malformations of heart and circulatory system
I35.2 Aortic Stenosis	R07.82 Chest Pain-Intercostal*	
Other ICD-10 code(s) and narrative		*May require additional coding*

Key Performance Indicators	2022	2023
Number of Orders	**7.5 order / Mo**	**72 orders / Mo**
Gaps Identified	Order Volume (By Test) • AAA Scan (6) • Arterial Doppler (31) • Carotid Doppler (16) • Pulmonary Function Test (12) • Resting Echocardiogram (7)	
Gaps Closed	15%	25%
Risk-Adjusted Factor (RAF) Score Improvement		**+5%**
Impact on Revenue per Provider		**+$4,000/ Mo**

Conclusions and Implications

- Promising impact of ML-enabled workflows for primary care

- Eliminating manual search, data sourcing, and data entry saves healthcare providers time & money

- Identifying at-risk patients with a clinical need for diagnostic evaluations and preventative screenings will proactively close care gaps and foster better health outcomes

Integrating AI/ML technology within a provider's workflow can reduce administrative burdens and improve operational efficiency and fiscal accountability.

Challenges and Lessons

EMR Implementation

- Fragmented EMR workflows
- **Lack of transparency in EMR** for patients being seen by specialists – improving transparency will lead to better care gap identification & diagnostic order automation

Care Gap Order Automation

- **Patient engagement** was the biggest factor that contributed to non-compliance reasons (e.g., cancelled orders, clinical cause, lack of patient response, patient refusal)
  - Improving patient engagement will lead to higher order conversion

Next Steps

ML & AI Explainability

- Focusing on transparency behind ML & AI decisions will foster better adoption of ML & AI tools in the clinical space

Patient Risk Management

- RAF Score

Additional Performance Metrics of Provider Proficiency

- CMS Star Rating, HEDIS Score, MIPS Score, CAHPS

Explainability

Why Digital Health Technologies should care:

- non-technical users don't understand them well (blackbox)
- How or when they work (background)
- Grasping the impact across society

Can easily go wrong with big tech

- **Transparency-washing**, (Zalnieriute, 2021)

- **Gamification**, (Charles AE Goodhart. 1984. Problems of monetary management: the uk experience. In Monetary theory and practice, pages 91–121. Springer)

- **Promote surveillance**, (Han, 2015; Mohamed et al., 2020; Birchall, 2021)

Foundation Model Transparency Index Scores, 2023

Company		Score
Meta	Llama 2	54%
BigScience	BLOOMZ	53%
OpenAI	GPT-4	48%
stability.ai	Stable Diffusion 2	47%
Google	PaLM 2	40%
ANTHROP\C	Claude 2	36%
cohere	Command	34%
AI21labs	Jurassic-2	25%
Inflection	Inflection-1	21%
amazon	Titan Text	12%
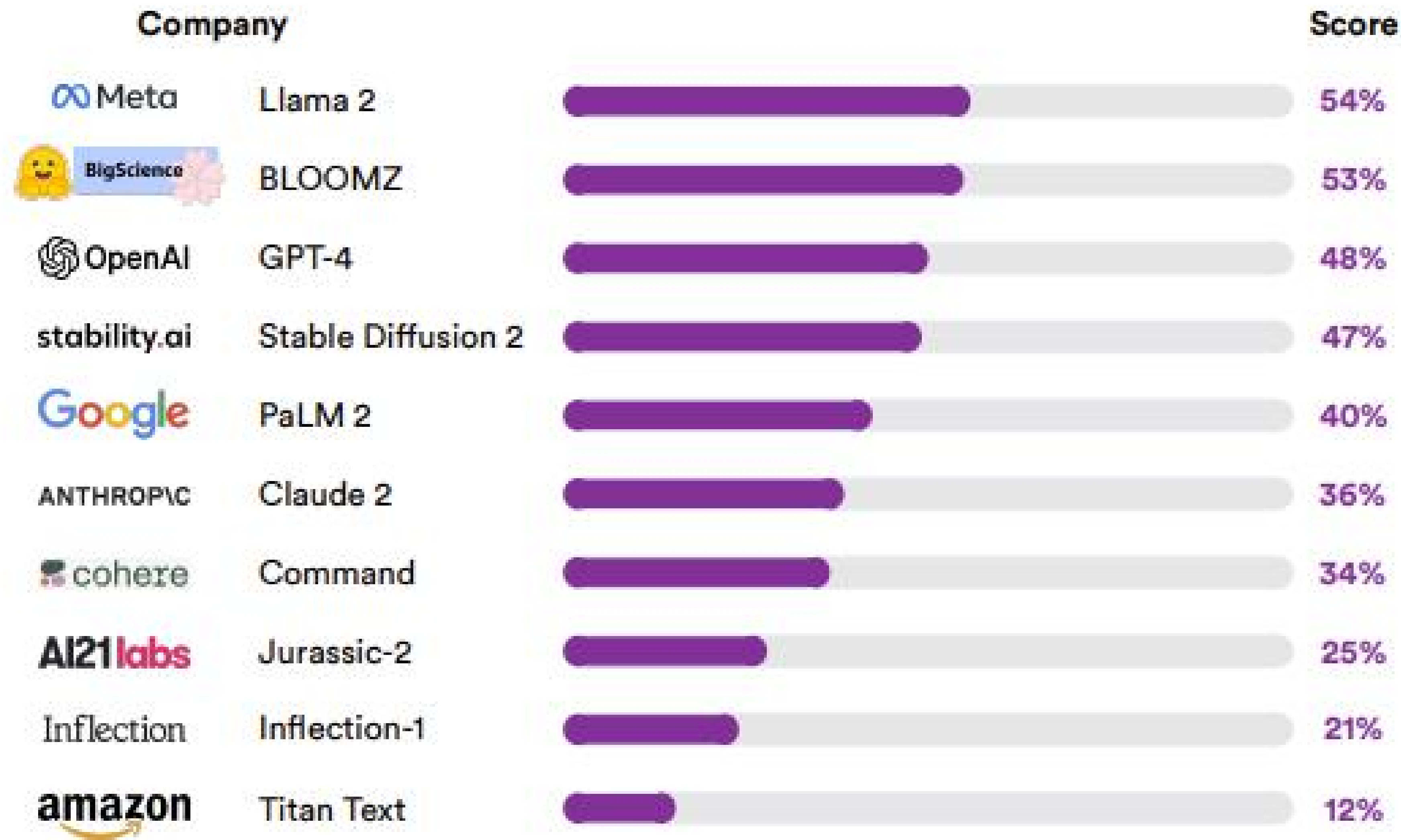
Source: Foundation Model Transparency Index (stanford.edu)

Poorest Performing Areas

Upstream Indicators

| |
|---|
| **Copyrighted data:** For all data used in building the model, is the associated copyright status disclosed? |
| **Data license:** For all data used in building the model, is the associated license status disclosed? |
| **Personal information in data:** For all data used in building the model, is the inclusion or exclusion of personal information in that data disclosed? |
| **Use of human labor:** Are the phases of the data pipeline where human labor is involved disclosed? |
| **Employment of data laborers:** Is the organization that directly employs the people involved in data labor disclosed for each phase of the data pipeline? |
| **Geographic distribution of data laborers:** Is geographic information regarding the people involved in data labor disclosed for each phase of the data pipeline? |
| **Wages:** Are the wages for people who perform data labor disclosed? |
| **Instructions for creating data:** Are the instructions given to people who perform data labor disclosed? |
| **Labor protections:** Are the labor protections for people who perform data labor disclosed? |
| **Third party partners:** Are the third parties who were or are involved in the development of the model disclosed? |

Downstream Indicators

Permitted and prohibited users: Is a description of who can and cannot use the model disclosed?
Permitted, restricted, and prohibited uses: Are permitted, restricted, and prohibited uses of the model disclosed?
Usage policy enforcement: Is the enforcement protocol for the usage policy disclosed?
Justification for enforcement action: Do users receive a justification when they are subject to an enforcement action for violating the usage policy?
Usage policy violation appeals mechanism: Is a mechanism for appealing potential usage policy violations disclosed?
Permitted, restricted, and prohibited model behaviors: Are model behaviors that are permitted, restricted, and prohibited disclosed?
Model behavior policy enforcement: Is the enforcement protocol for the model behavior policy disclosed?
Interoperability of usage and model behavior policies: Is the way that the usage policy and the model behavior policy interoperate disclosed?

Model Indicators

Risks description: Are the model's risks disclosed?
Risks demonstration: Are the model's risks demonstrated?
Unintentional harm evaluation: Are the model's risks related to unintentional harm rigorously evaluated, with the results of these evaluations reported prior to or concurrent with the initial release of the model?
External reproducibility of unintentional harm evaluation: Are the evaluations of the model's risks related to unintentional harm reproducible by external entities?
Intentional harm evaluation: Are the model's risks related to intentional harm rigorously evaluated, with the results of these evaluations reported prior to or concurrent with the initial release of the model?.
External reproducibility of intentional harm evaluation: Are the evaluations of the model's risks related to intentional harm reproducible by external entities?
Third party risks evaluation: Are the model's risks evaluated by third parties?
Mitigations description: Are the model mitigations disclosed?
Mitigations demonstration: Are the model mitigations demonstrated?
Mitigations evaluation: Are the model mitigations rigorously evaluated, with the results of these evaluations reported?
External reproducibility of mitigations evaluation: Are the model mitigation evaluations reproducible by external entities?
Third party mitigations evaluation: Can the model mitigations be evaluated by third parties?
Trustworthiness evaluation: Is the trustworthiness of the model rigorously evaluated, with the results of these evaluations disclosed?
External reproducibility of trustworthiness evaluation: Are the trustworthiness evaluations reproducible by external entities?
Inference duration evaluation: Is the time required for model inference disclosed for a clearly-specified task on a clearly-specified set of hardware?
Inference compute evaluation: Is the compute usage for model inference disclosed for a clearly-specified task on a clearly-specified set of hardware?

Source: Foundation Model Transparency Index (stanford.edu)

Foundation Model Transparency Index Scores, 2023
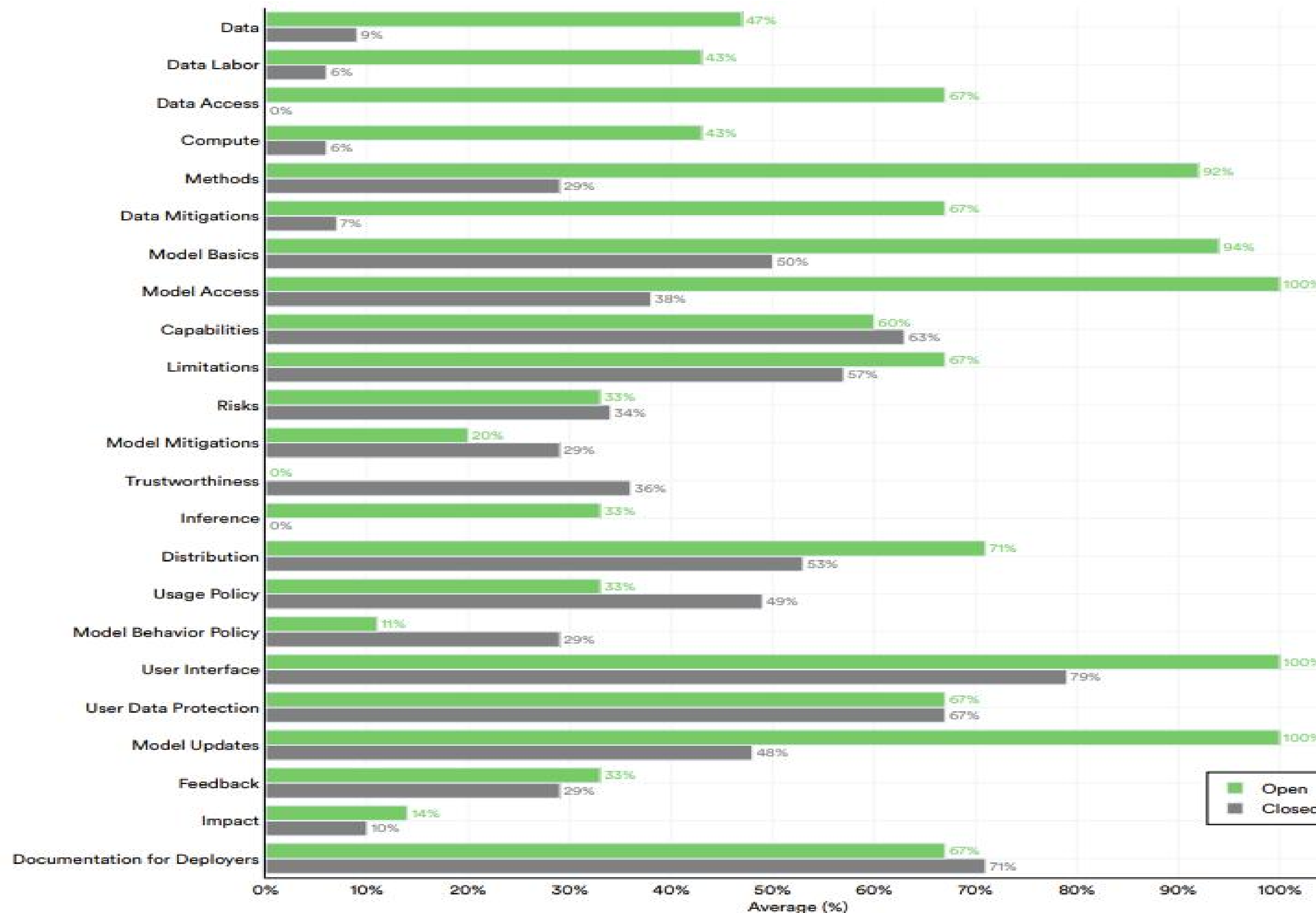
Closed Developers struggle in:

Data, Data Labor, Data Access, Compute, Data Mitigation, Model Basics, Inference

Open Developers struggle in:

Model Mitigation, Trustworthiness, Model Behavior Policy

ParaDocsHealth

Built by Doctors, for Doctors

Omar Mohtar
(MD / PHD)
Chief Executive Officer
Physician Innovator

Dhini Nasution
(MD / MAP)
Chief Operating Officer
Clinical AI Specialist

Glenn Davis
(MD)
President / Clinical Champion
Cypress Physicians Association

Maria Berdayes
(DO)
President / Medical Director
Millennium Physicians IPA

Lance Black
(MD / MBID)
Healthcare Advisor / TMCi
Medical Director / 3ive Labs

Vibhav Jha
(MS)
Chief Technology Officer
Machine Learning Specialist

Matthew Segar
(MD / MS)
Cardiology Fellow
Texas Heart Institute

Toby Hamilton
(MD)
Founder / CEO
Hamilton Health Box

Kyle Robertson
(JD)
Healthcare Entrepreneur
NarrativeDx / Press Ganey

LEADERSHIP — **ADVISORY BOARD**